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Output and Productivity Performance of Hong Kong and Singapore's Transport and Communications Sector, 1990 to 2005

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Abstract:

This paper examines the output and productivity performance of the Transport and Communication sector in Hong Kong and Singapore, from 1990 to 2005. The aim of the paper is two-fold. First, the paper introduces a method for derivation of appropriate currency converters or purchasing power parities (PPPs) to enable quantification of output and productivity at various disaggregated levels of the transport and communications sector. This method is based on the industry-of-origin approach as refined by the International Comparisons of Output and Productivity (ICOP) project based at the University of Groningen. Second, the paper will attempt to address differences in output and productivity levels between these two countries with regard to their current policies in transport and communications. It will also examine the impact of events such as the Asian financial crisis, the global downturn in 2001, the events of September 11, as well as the outbreak of the Severe Acute Respiratory Syndrome (SARS) in 2003 on the transport and communication sector.

JEL Classifications: C430; D290; L910; L960; O570

Keywords: Purchasing Power Parity; Comparative Price Level

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[1] Figures are based at local currency 2000 prices drawn from each country's respective Statistical Yearbook (for Singapore – Yearbook of Statistics 2006) and website (for Hong Kong – Census and Statistics Department). 2005 figures for Hong Kong will be revised when more data becomes available.

1. Introduction

Since the beginning of the 1990s, the service sectors in industrial countries have grown to become major contributors towards economic growth reflecting their growing share of GDP and rising levels of employment in services. This is also noticeable in several Asian nations, especially Hong Kong and Singapore. In 2000, Hong Kong's service sector accounted for 82.7 percent of total GDP. This rose to 87 percent of total GDP in 2005. In Singapore, the service sector's contribution to GDP rose from 61.2 percent in 2000 to 63.1 percent in 2005. The breakdown of GDP contribution within the service sector shows the increasing importance of transport and communications, with Hong Kong at 9 percent in 2000 and 10.4 in 2005, while in Singapore this was 11.5 percent and 11.8 percent, respectively[1].

The growing share of GDP contribution by services for both Hong Kong and Singapore is the result of a myriad of factors, the most important of which is their recognition as being the two most open economies in the world. This is evidenced in work of the annual Heritage Foundation/Wall Street Journal Index of Economic Freedom. Both countries have excellent port facilities with no tariffs and have high standards of air transport services. The finance industry of both countries has also grown over the last sixteen years largely because of sound economic management, and well-developed infrastructure. Compounded by the emerging markets of China and India, both countries are poised to play an even greater role in many areas of services, especially in entrepot trade largely associated with the geographical co-location of Hong Kong and China while Singapore is at the trade and investment cross-roads of China and India. Before the 1990s, the telecommunications industry was relatively unsophisticated since it consisted predominantly of fixed line communications and facsimile. Mobile phone technology was still in its infancy and the internet was not freely available for consumer usage. Over the last sixteen years, the development of information technology produced a rise in the importance of mobile phone technology and internet services. Communications has grown to become a significant contributor to GDP.

Both Hong Kong and Singapore have a rich history in terms of port and shipping activity with regard to entrepot trade. According to port rankings (ie. busiest ports) in terms of shipping tonnage, cargo tonnage and number of Twenty-foot Equivalent Units (TEUs), both Hong Kong and Singapore are in the top ten with Singapore overtaking Hong Kong in 2005 as the world's busiest container port. These two countries are also ranked in the world's top ten in airline and airport services, according to Skytrax World Airline survey 2005. The period 2001 to 2005 saw Hong Kong named as the number one airport in the world. It was overtaken by Singapore as the principal airport in the world in 2006. In telecommunications, both countries are also major users of the internet based on the number of subscribers per capita. The Communications Outlook 2003 published by OECD, shows that for 2001 Korea, Denmark and Sweden top the list in internet subscribers per capita. The number of internet subscribers per 100 inhabitants in these countries is 59, 50 and 37 respectively. In a similar period, the number for Hong Kong and Singapore were 40 and 47 respectively, well in line with major OECD internet users[2].

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[1] Figures are based at local currency 2000 prices drawn from each country's respective Statistical Yearbook (for Singapore – Yearbook of Statistics 2006) and website (for Hong Kong – Census and Statistics Department). 2005 figures for Hong Kong will be revised when more data becomes available.

[2] Figure for Hong Kong refers to year 2000. Number of internet subscribers drawn from Census and Statistics Department 2006, Hong Kong in Figures; Population figure drawn from ILO. Figure for Singapore refers to 2001. Number of internet subscribers drawn from Yearbook of Statistics 2005; population figures drawn from ILO.

The paper is the first in a series of Hong Kong-Singapore comparisons intended to cover the major industries in the service sector, namely wholesale and retial trade, finance, health, education, etc. So far, no direct comparisons between the service sectors of these two economies have been attempted. This study will be of great interest to researchers, economists, and policy makers since it aims to shed some light on the relative performance of these two countries' transport and communications sector since 1990. These two countries are well aware of the fact that being small in size and constrained by land space, with few natural resources, there is a need to provide an efficient level of transportation and communications in order to compete with other larger economies with abundant natural resources. Hence, the strategic development of transport and communications infrastructure at the early stage of both countries' economic development has greatly helped promote growth in other service industries.

When a comparative analysis involves services, two major problems arise. First is the difficulty in distinguishing prices, quantities and quality of services. Hill (1977) noted that the quantity of a service is difficult to capture as it often represents a process by which a consumer or consumer good is changing. Furthermore, unlike manufactured goods, services are characterised by a greater degree of heterogeneity, which makes aggregation difficult. This issue is discussed in Section 2 when analysing the quantification of output for transport and communications. Second, meaningful real output comparisons are difficult as each country's output is expressed in its own currency unit and has to be converted into a common currency. Direct comparisons require the use of an appropriate currency converter. The use of official exchange rates is not suitable since they are heavily influenced by capital movements and exchange rate adjustments and do not reflect real price differences between countries. Appropriate currency conversion makes use of the concept of purchasing power parity (PPP). Some well-known studies (see Kravis, Heston and Summers (1982), and OECD (1992)) have derived PPPs via the expenditure side of national accounts. However, PPPs derived from the expenditure side of national accounts are not appropriate for use in the current study, as they cannot be used directly in a sectoral analysis of output and labour productivity comparisons since they do not produce real product by industry. This implies that the PPPs to be used in this study must be derived from the production side in order to develop real output and productivity comparisons.

The aim of the study is two-fold. First, the paper adopts a method of derivation of PPPs via the industry-of-origin approach as employed by Mulder (1994), Van Ark, Monnikhof and Mulder (1999), and Lee and Shepherd (2002) in order to attempt a direct comparison of real output and productivity of the transport and communications sectors between Hong Kong and Singapore for the period 1990 to 2005. Second, the paper will attempt to address differences in output and productivity levels between these two countries with regard to their current policies in transport and communications. It will also examine the impact of events such as the Asian financial crisis, the global downturn in 2001, the events of September 11 and the outbreak of the Severe Acute Respiratory Syndrome (SARS) in 2003 on their transport and communications sector.

The paper is divided into 4 sections. Following the introduction, Section 2 describes the sources and methodology used in the study. Section 3 presents the results of real output and productivity comparisons for the benchmark year 2004 and productivity trends from 1990 to 2005. The paper concludes with some brief remarks.

2. Sources and Methodology

The ICOP approach employed in this study uses disaggregated or detailed data from relevant survey reports and publications. The disaggregated or detailed data refers to the

three-digit level of the SIC for Hong Kong and the four to five-digit code of the SIC for Singapore in their respective transport and communications sectors. While the Hong Kong SIC codes used are at the three-digit level, their descriptions correspond to the four-digit level and at times to the five-digit level description used in Singapore. Detailed data on prices and quantity output for the benchmark year 2004 are required to enable the ICOP approach to be employed. The data sources for each country used for the derivation of PPPs for the specified benchmark year, 2004, are listed in Table 1.

For the time-series (1990-2005), value added figures were derived from each country's yearbook of statistics which closely follows the system of national accounts (SNA).

Table 1
Quantity and Value Output of Freight and Passengers in Transport and Communications, Hong Kong and Singapore, 2004

	Quantities Produced ('000) Terminal Services (passengers or tonnes)			Gross Value of Output (d)	
	Singapore	Hong Kong	Hong Kong/ Singapore (%)	Singapore (mill. S$)	Hong Kong (mill. HK$)
	(1)	(2)	(3)	(4)	(5)
Passenger Transport					
- Rail	487,878 a	1,400,056	287.0		
- Buses (Land)	1,020,408 a	2,203,317 b	215.9	1,223 e	25,042
- Taxis	320,616 a	377,828	117.8		
- Sea/coastal water transport	7,482	21,407	286.1	80	2,323
- Air (arrival and departure)	28,606	36,287 c	126.8	8,129	31,813
Freight Transport					
- Rail	na	272	na		
- Trucks (Land)	na	40,474	na	921	13,179
- Sea (cargo throughput)	393,418	220,879	56.1	13,049	52,050
- Port container throughput (TEUs)	21,329	21,984	103.1	7,318 g	13,709 g
- Air	1,775	3,090 f	174.1	3,450	17,795

Communications	Singapore ('000 number)	Hong Kong ('000 number)	Hong Kong/ Singapore (%)	Singapore (mill. S$) j	Hong Kong (mill. HK$) k
- Telephone lines (Subs.) (h)	1,864	3,780	202.8	3,610	19,979 m
- Mobile Phone Subs.	3,861	8,214 i	212.7	2,105	11,970
- Internet Subs (broadband)	512	1,484	289.8		2,663
- Internet Subs (dial-up)	1,714	1,004	58.6	1,440	179
Total	7,951	13,478	169.5	7,155 n	34,791
	('000 number)	('000 number)			
- Mail handled (excludes parcels)	834,402 l	1,273,000	152.6	295 o	3,567 p

TEU - Twenty-foot equivalent units (based on a standardised container size of 20 ft. x 8 ft.x 8 ft.)
na - not available.

Notes:
(a) Figures derived by multiplying average daily passenger-trips to the number of days for 2004 (ie. 366 days).
(b) Includes franchised buses, public light buses, residents' services, KCRC light rail transit feeder bus.
(c) This figure is drawn from the Civil Aviation Department via http://www.cad.gov.hk/english/p-through.htm (accessed on 12 September 2006).
(d) Gross value output for Singapore and Hong Kong refer to gross receipts of their respective passenger and freight revenue. Note that the sum of the value output for each country does not tally with the value output given in each country's statistical publication due to ommission of services incidental to transport and others not elsewhere classified such as storage and warehousing. In addition, the gross receipts for the primary actrivity is only taken into account. All other sideline gross receipts are excluded.
(e) Chartered bus and school bus not included.
(f) Only international. Tonnes refers to air cargo throughput.
(g) Port container throughput value output refers to business/operating receipts of 'supporting services to water transport'. This is based on the fact that the activity relates to the need for cargo-related facilities and services.
(h) At end of period. Excludes fax lines.
(i) Figure refers to fiscal year ending 31 March 2005. Data drawn from website of Office of the Telecommunications Authority via http://www.ofta.gov.hk/en/datastat/hktelecom-indicators.html accessed on 6 September 2006.
(j) Singapore figures drawn from individual annual reports of Singtel, StarHub, M1 and Pacific Internet. For Singtel, this refers to operating revenue by service only within Singapore. Optus excluded.
(k) Gross value output here refers to business receipts. It is important to note that the sum of all business recepits do not tally with the total business receipts as the primary subscription is taken into account. All other sideline gross receipts are excluded.
(l) Data drawn from IDA website http://www.ida.gov.sg (accessed on 31 October 2006). Data differs to the one found in Yearbook of Statistics 2005 probably due to concept and coverage. As the latter source does not clearly specify inclusion/exclusion of parcels (terms used is postal articles handled) whereas IDA only considers both domestic and international mail, the IDA data is thus used.
(m) Refers to telephone and telegraph services.
(n) Figure here does not tally but very similar to the revenue ($7,190 million) from the Economic Survey Series 2004, Information & Communication Services.
(accessed on 12 September 2006). Revenue in this table refers only to the primary subscription.
(o) Operating revenue for mail only and refers to Singapore Post. Figure is for financial year 2004/05 (ie. 1 April 2004 to 31 March 2005)
(p) Refers to general mail services turnover referred to in the Hong Kong Post Annual Report 2004/05.

Source: For Hong Kong:
Census and Statistics Department 2006, Hong Kong in Figures.
Monthly Traffic and Transport digest via http://www.td.gov.hk/transport_in_hong_kong/transport_figures/monthly_traffic_and_transport_digest/index.htm (accessed on 6 September 2006).
Hong Kong Monthly digest of Statistics 2005: Air Cargo Statistics.
Census and Statistics Department, Report on 2004 Annual Survey of Transport and Related Services, Logistics and Producer Prices Statistics Section.
Census and Statistics Department, Report on 2004 Annual Surveys of Storage, Communication, Banking, Financing, Insurance and Business Services, Business Services Statistics Section.
Hong Kong Post Annual Report 2004/05 via http://www.hongkongpost.com/eng/publications/annual/2004_2005/index.htm (accessed on 19 September 2006).
For Singapore:
Singapore Department of Statistics, Yearbook of Statistics Singapore 2005. Ministry of Trade and Industry.
Land Transport Authority, Singapore Land Transport Statistics in brief 2005.
Economic Survey of Singapore Second Quarter 2006 via http://www.singstat.gov.sg/keystats/economy.html#services (accessed on 7 September 2006).
Singapore Department of Statistics, Transport Services reference year 2004, Economic Survey Series.
Mail value output (ie. Operating revenue) drawn from Singpost Annual Report 2004/05 via http://www.singpost.com.sg (accessed on 19 September 2006).
Singtel, Singapore Telecomms Limited Annual Report 2004/2005.
StarHub Annual Report 2005.
MobilOne Limited (M1) Annual Report 2004.
Pacific Internet Limited Annual Report 2004 via http://library.corporate-ir.net/library/11/117/117746/items/154924/2004.pdf (accessed on 27 September 2006).

A major obstacle in transport and communications comparisons is the measurement of output. Some studies measure output only in physical terms. For example, Girard (1958), and Gadrey, Noyelle and Stanback Jr. (1990) measured output in terms of tonnes-km and passenger-km for the transport industry. For the communications industry, Rostas (1948), and Paige and Bombach (1959) used the number of calls and access lines and the number of mail handled. There are also some studies which weight physical output in terms of relative prices (for example, revenue or value of output per passenger-km or tonne-km), and use this weighting system to derive Laspeyres and Paasche PPPs. These are then converted into a common currency. It is however, crucial to note that if countries with different average haul distances or passenger trip length are

compared, the output measure must take separate account of loading and unloading services and costs which are more important, proportionately, in a country with shorter hauls or passenger trips. This issue is particularly noted in Lee and Shepherd (2002). Their study on South Korea and Australia emphasises the difference in the average distance of passenger and freight transport as a result of the vast difference in the two country's geographical size. Thus, to derive an output measure to account for the average haul distance or passenger trip, the activity of loading and unloading, termed as terminal services, must be included. Some studies which exclude the terminal services are Rostas (1948), Girard (1958) and Pilat (1994). On the other hand, they are included in total output estimates by Paige and Bombach (1959), Smith Hitchens and Davies (1982), Mulder (1994), and Lee and Shepherd (2002). For the current study however, only output for terminal services in the transport industry are used. Output in terms of tonnes-km and passenger-kms, also known as moving services, are excluded since this information is not released in any of the statistical publications and affiliated annual reports and surveys for both countries.

The current study employs the ICOP approach used by earlier ICOP studies (see Mulder (1994), and Van Ark, Monnikhof and Mulder (1999), and Lee and Shepherd (2002)). Essentially, the ICOP approach aims to derive PPPs for the benchmark year in order to convert each country's value added and labour productivity into a numerary currency value. For the benchmark year, three levels of PPPs are calculated; sample industry PPPs, branch level PPPs and the transport and communications sector PPP.

The notations used in the study are as follows. *Q* and *P* refer to quantity and price, respectively. Countries *H* and *S* are the alternate and base country, respectively. In the current study, *H* refers to Hong Kong and *S* refers to Singapore. Subscript *i* refer to item or service, *j* refers to the type of industry, and *k* refers to the type of branch. Lower-case *s* refers to the sample industry.

The sample industry PPPs are derived by aggregating all matched products/service within a sample industry. Matching of products/service is made at the 3-digit level according to the Hong Kong SIC code with the 4-digit and 5-digit Singapore SIC code. The sample industry PPPs are expressed as follows.

$$PPP_j^{HS(H)} = \frac{\sum_{i=1}^{s} Q_{ij}^H \times P_{ij}^H}{\sum_{i=1}^{s} Q_{ij}^H \times P_{ij}^S} \qquad (1)$$

$$PPP_j^{HS(S)} = \frac{\sum_{i=1}^{s} Q_{ij}^S \times P_{ij}^H}{\sum_{i=1}^{s} Q_{ij}^S \times P_{ij}^S} \qquad (2)$$

Expression (1) and (2) are the Paasche and Laspeyres price indices, respectively, where $PPP_j^{HS(H)}$ is the purchasing power parity of the currency of country *H* against the currency of country *S* in industry *j*, at quantity weights of country *H*. $PPP_j^{HS(S)}$ is the purchasing power parity of the currency of country *H* against the currency of country *S* in industry *j*, at quantity weights of country *S*
i =1….*s* is the sample of matched items.

Branch level PPPs are derived by weighted averaging of the parities of the sample industries that belong to a given branch. The weights used in this paper are based on value output shares[3]. The PPP for a given branch *k* is expressed as

$$PPP_j^{HS(H)} = \frac{\sum_{j=1}^{b_k} VA_j^{H(H)}}{\sum_{j=1}^{b_k} \left[VA_j^{H(H)} \Big/ PPP_j^{HS(H)} \right]} \qquad (3)$$

at value added share weights of country *H*, and

$$PPP_k^{HS(S)} = \frac{\sum_{j=1}^{b_b} \left[VA_j^{S(S)} \times PPP_j^{HS(S)} \right]}{\sum_{j=1}^{b_b} VA_j^{S(S)}} \qquad (4)$$

at value added share weights of country *S* In Equations (3) and (4), VA_j refers to value added of the j-th sample industry and PPP_j represents the j-th sample industry purchasing power parity.

Finally, sectoral PPPs are derived by aggregating the branch level PPPs and using the weights of value added for each branch. The formulae are similar to expressions (3) and (4) and are expressed as follows.

$$PPP^{HS(H)} = \frac{\sum_{j=1}^{k} VA_k^{H(H)}}{\sum_{j=1}^{k} VA_k^{H(H)} \Big/ PPP_k^{HS(H)}} \qquad (5)$$

$$PPP^{HS(S)} = \frac{\sum_{j=1}^{k} \left[VA_k^{S(S)} \times PPP_k^{HS(S)} \right]}{\sum_{j=1}^{k} VA_k^{S(S)}} \qquad (6)$$

For the final comparisons of transport and communications gross value added and labour productivity, only the Fisher PPP is used. The Fisher PPP is derived by taking the geometric average of expressions of (5) and (6), as shown below.

$$PPP^{Fisher} = \sqrt{PPP^{HS(H)} \times PPP^{HS(S)}} \qquad (7)$$

The current study's derivation of PPPs employs the single-deflation approach. Ideally, it would be desirable to derive the PPPs using the double-deflation approach but this requires information on quantities and value of inputs which are not available. For the time-series comparisons, conversion of time-series value added figures involve a set of PPPs across time (ie. from 1990 to 2005). These are derived by applying the ratio of Hong Kong-Singapore transport and communications GDP implicit deflators, with 2004 as base, to the 2004 transport and communications PPP derived in expression (7). The time-series PPPs are then used to convert the value added at current prices into constant 2004 prices.

3. Results

3.1 Relative Size and Structure of the Transport and Communications Sector in Hong Kong and Singapore, 2004

[3] The ICOP method essentially uses value added as weights but due to lack of value added figures in the communications industry for both countries, value output had to be used as the weights.

Tables 2 and 3 contain estimates of gross value of output, gross value added and employment, by branch, for Hong Kong and Singapore, for the benchmark year 2004, respectively. These data provide an indication of the size and structure of each country's transport and communications sector.

The following points are to be noted with regard to Tables 2 and 3. The value output figures for both tables are expressed in market prices and refer to gross receipts. The value added figures for Hong Kong are not clearly defined as to whether they refer to market price or factor cost. While value added for Singapore is at factor cost since the concept described in the survey excludes the impact of taxes including goods & services taxes (and subsidies) on products. The value of output figures in Tables 2 and 3 are also much higher than those shown in Table 1 since the latter estimates are the result of the quantities produced by each transport or communication mode. Table 1 thus accounts only for the mode of transport/communication identified and excludes all other aspects of gross receipts.

The number of persons engaged for Hong Kong, based on its survey reports on transport and communications, is 244,159. This is approximately 70 percent of the national accounts' figure of 350,700 persons. The reason for the difference is that coverage for the *2004 Annual Survey of Transport and Related Services* excludes non-owner operators of taxis, public light buses and individual transport labourers. These missing data are explained in the notes in Table 2. For Singapore, in the Economic Survey series, *Transport Services Reference year 2004*, the operation by persons or organisations not registered with the Accounting and Corporate Regulatory Authority (ACRA) or Registry of Societies, such as taxi drivers, were excluded. As such, to account for the number of taxi drivers, the number of total valid vocational licenses issued (73,081) for 2004 was included in the estimate of the number of persons employed in the transport and communications sector in Singapore.

In terms of size, the gross value of output in Hong Kong transport and communications, expressed in Singapore dollars at the PPP rate (S$1.00 = HK$4.02 drawn from Table 4) is $109,582 million and for Singapore, $60,069 million, approximately 82 percent above Singapore's output. Using national accounts' figures, transport and communications gross value added is $31,557 million in Hong Kong based on Singapore dollars, and in Singapore, $21,489 million, 47 percent above Singapore's level. At 2004 Singapore dollars, based on national accounts figures, gross value added is 29 percent of transport and communications gross output in Hong Kong compared with 36 percent in Singapore. This suggests that Hong Kong uses relatively more intermediate inputs. Hence, the number of persons engaged in Hong Kong is 1.65 times that of Singapore, using national accounts estimates. Overall in 2004, Hong Kong's transport and communications sector contributed 11.2 percent of total GDP and 10.6 percent of total employment, while for Singapore the comparable figures are 12 percent and 10.3 percent[4].

[4] Data based on national currencies drawn from each country's statistical yearbooks.

Table 2
Gross Value of Output, Gross Value Added, Number of persons engaged by branch, Transport and Communications of Hong Kong, 2004

	Gross Value of Output b (mill. HK$) (1)	Gross Value Added b (mill. HK$) (2)	Share in Total Transport & Communications (% of Value Added) (3)	Number of Persons Engaged (4)	Share in Total Transport & Communications (%) (5)
Transport	378,669	100,216	83.1	319,994	91.2
Land	50,419 a	29,662	24.6	204,103 e	58.2
Sea and PCT	75,857	24,131	20.0	34,288	9.8
Air	76,117	28,216	23.4	29,288	8.4
Services allied to transport (d)	176,277	18,207	15.1	52,315	14.9
Communications	61,717 c	20,358 c	16.9	30,706	8.8
Telecommunications	49,705	17,151	14.2	17,887	5.1
Postal services	12,012	3,208	2.7	12,819	3.7
Transport & Comms.					
Current Table	440,386	120,574	100.0	350,700 f	100.0
National Accounts	n.a.	126,820	-	350,700	-
ILO	-	-	-	358,200	-

n.a. - not available. PCT - port container throughput.
Notes: (a) Includes supporting services to land transport.
(b) Values are most likely in market prices as they are based on gross receipts. Figures here differ to Table 1 as it includes all other incomes and business receipts besides passenger and freight revenue.
(c) Communications figure is the sum of telecommunications and postal services. Figure here is for the whole industry and as such its figure is higher than table 1 since Table 1 only covers the primary activity.
(d) The 2004 Annual Survey of Transport and Related Services does not include storage. To include storage under 'services incidental to transport' so as to correpond to the Singapore concept and figures in Table 3, such data were drawn from the Report on 2004 Annual Surveys of Storage, Communication, Banking, Financing, Insurance and Business Services.
(e) From the survey coverage of land transport number of persons engaged in the 2004 Annual Survey of Transport and Related Services, non-owner operators of taxis and public light buses and individual transport labourers were excluded. Thus the true number of persons engaged for land transport excluding those identified is 97,562. As there were no sampling done for these and to include their numbers, we assume that the difference between the national accounts' number of persons employed and the aggregated figure of transport and communications from the annual surveys which gives an employment figures of 244,159 should arrive at a decent figure to represent the non-owner operators of taxis and public light buses and individual transport labourers. (350,700 - 244,159 = 106,541; 97,562 + 106,541 = 204,103).
(f) Number of persons engaged less non-owner operators of taxis and public light buses and individual transport labourers was 244,159 persons.

Source: Census and Statistics Department, Report on 2004 Annual Survey of Transport and Related Services, Logistics and Producer Prices Statistics Section.
Census and Statistics Department, Report on 2004 Annual Surveys of Storage, Communication, Banking, Financing, Insurance and Business Services, Business Services Statistics Section.
ILO, Yearbook of Labour Statistics 2005. Geneva.

In terms of structure, the largest contributors to gross output and value added in Hong Kong are air transport and land transport, respectively (excluding services allied to transport). However, value added in air transport was just 5% less than the land transport value added contribution, thus signifying its importance. This is largely due to Hong Kong's intensive development in its airport facilities with the newly-built Hong Kong International Airport which went operational in 1998. This is recognised by achievement of the best airport award for five years in succession, from 2001 to 2005[5]. Its national airline carrier, Cathay Pacific, has also won numerous awards due to its airline facilities and excellent service. Despite this, land transport was the main contributor to value added and employment, which signifies the relative importance of Hong Kong's road and train systems. This is especially the case in terms of length of road and rail kms per capita (in 1,000 inhabitants). Hong Kong recorded 0.31 kms per thousand inhabitants in 2004, while Singapore recorded 0.78 kms per thousand inhabitants. This is further verified in terms of the number private cars per capita, with Singapore at 9.6, nearly twice that of Hong Kong's 5.0 cars per capita[6]. A study by Luk and Olszewski (2003) also showed Hong Kong having a relatively higher share in public transport than Singapore. This implies that the

[5] This award is based on a quality survey conducted by Skytrax (http://www.airlinequality.com/).
[6] Populations for Singapore and Hong Kong in 2004 are 4.273 million and 6.963 million, respectively. Number of private cars for both countries is 412,015 and 346,757, respectively. Data are drawn from each country's respective Yearbook of Statistics.

rate of use of public transport is greater in Hong Kong than in Singapore. Again, this helps explain the significant proportion of value added in land transport in Hong Kong. In Singapore, the largest contributor to gross output and value added is sea transport (inclusive of port container throughput). This is to be expected since Singapore is heavily dependent on entrepot trade and provides excellent port facilities 24 hours a day. Second in value added contribution is air transport at 23.4 percent of value added. This demonstrates Singapore's civil aviation focus on providing excellent service and facilities. This is evident by the various awards Singapore's Changi Airport and Singapore International Airlines have won over the past decade. The bulk of employment in land transport, of which, 37.5 percent are taxi operators, and 14.6 percent are bus operators, lorry operators and those operating the mass rapid transit (MRT) system.

The value added contribution of telecommunications in Hong Kong and Singapore are 14.2 percent and 17.4 percent, respectively. This also illustrates the importance of telecommunications in an environment where communications play a vital role in other service industries. With the development of new technologies, telecommunications experienced major extension and development which now permits instant and easy access to information. This is especially so with the increasing number of telephone service providers in terms of fixed-line, mobile and internet service providers.

Table 3
Gross Value of Output, Gross Value Added, Number of persons engaged by branch, Transport and Communications of Singapore, 2004

	Gross Value of Output b (mill. S$) (1)	Gross Value Added b (mill. S$) (2)	Share in Total Transport & Communications (% of Value Added) (3)	Number of Persons Engaged (4)	Share in Total Transport & Communications (%) (5)
Transport	50,723	16,508	80.2	173,752	89.1
Land	3,539 a	1,935	9.4	102,258 g	52.4
Sea and PCT	26,297	7,831	38.1	21,177	10.9
Air	16,530	4,811	23.4	21,682	11.1
Services allied to transport (f)	4,358	1,931	9.4	28,635	14.7
Communications	9,345 c	4,066 c	19.8	21,347	10.9
Telecommunications	8,259	3,574	17.4	15,067	7.7
Postal services (e)	1,086 d	491	2.4	6,280	3.2
Transport & Comms.					
Current Table	60,069	20,573	100.0	195,099	100.0
National Accounts	n.a.	21,489	-	212,500	-
ILO	-	-	-	212,500	-
MRSD - Manpower 2005 (h)	-	-	-	191,974	-
MRSD - Labour Market 2005 (i)	-	-	-	188,224	-

n.a. - not available. PCT - port container throughput.
Notes: (a) Includes supporting services to land transport.
(b) Gross value output is most in market prices as they are based on gross receipts. Value added is in factor cost as the concept described in the survey excludes the impact of taxes including Goods & services tax (and subsidies) on products. Figures here differ to Table 1 as the values in this table includes all other incomes and business receipts besides passenger and freight revenue.
(c) Communications figure is the sum of telecommunications and postal services. Figure here is for the whole industry and as such its figure is higher than table 1 since Table 1 only covers the actual activity for the its' respective industry.
(d) Operating receipts.
(e) Postal services estimates were derived by deducting Transport, and Information and Communications (excludes postal) from Transport, Information and Communications (includes postal). From the Economic Survey Series, the survey on 'Information and Communications 2004' excludes postal services while the survey 'The Services sector 2004' which covers Transport, Information and Communications covers all forms of transport and communications including postal services. By taking their differences, an estimate for postal services is thus derived.
(f) Includes storage and warehousing.
(g) Coverage of Land transport in the Economic Survey series, Transport Services reference year 2004 excludes the number of taxi drivers. In order to include them in the number of persons engaged, the number of total valid vocational licenses issued added (73,081) for 2004 is to the land transport number of persons engaged from the above source.
(h) Manpower Research and Statistics Department. Refers to Dec 2004.
(i) Manpower Research and Statistics Department. Data based on SSIC 2000. Refers to Dec 2004.

Source:
Singapore Department of Statistics, Transport Services reference year 2004, Economic Survey Series.
Singapore Department of Statistics, Information and Communications Services reference year 2004, Economic Survey Series.
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3.2 Purchasing Power Parities and Comparative Price Levels

Tables 4 shows the Paasche, Laspeyres and Fisher PPPs by branches and for overall transport and communications for the benchmark year 2004. Comparative price levels for each branch are also shown.

The branch PPPs for both transport and communications were higher at Singapore quantity weights. Any disparity between the PPPs at different quantity weights reflect the differences in each country's transport and communications structure, relative price structure, output composition and geographical structure. From Table 4, the similarity in the PPPs at each country's quantity weight indicates the similarity in their transport and communications structure, similarity in the type of service provided and a similar standard of living based on their real national income levels. It is noted that different PPPs arising from the use of different countries' quantity weights emanate from comparisons of poor and rich countries, which in turn, is largely due to differences in each country's production

structure and consumer preferences. Since Hong Kong and Singapore have similar wealth, their PPPs at each country's quantity weights show little variation.

Table 4
Paasche, Laspeyres and Fisher PPPs for Transport and Communications, Singapore and Hong Kong, 2004

	At Hong Kong quantity weights (Paasche PPP)	At Singapore quantity weights (Laspeyres PPP)	Geometric Average (Fisher PPP)	Comparative Price Level (S'pore = 100)
Transport:	4.19	4.62	4.40	95.48
Land	9.41	9.41	9.41	204.18
Sea & PCT	4.51	5.22	4.85	105.35
Air	3.04	3.05	3.04	66.07
Communications	2.77	2.73	2.75	59.69
Telecommunications	2.59	2.52	2.56	55.48
- Telephone Subs.	2.73	2.73	2.73	59.22
- Mobilephone subscription	2.67	2.67	2.67	58.02
- Internet subscription	1.77	1.77	1.77	38.33
Mail handled	7.92	7.92	7.92	171.78
Transport & Communications	3.78	4.28	4.02	87.22
Exchange Rate	-	-	4.61	

Notes: PCT - Port Container throughput
S'pore: Singapore.
Paasche and Laspeyres PPPs for overall transport and communications were derived by weighting the PPPs of separate branches using value output as weights. Comparative price level calculated by dividing PPP by the exchange rate. Exchange rate is period average.

Source: Exchange rate from IMF, *International Financial Statistics, 2005*. Washington D.C.
Appendix Table A1.

The geometric average PPP for transport and communications as a whole in 2004 is HK$4.02 to the Singapore dollar, compared to an exchange rate of HK$4.61 to the dollar. Taking the ratio of the geometric average PPP to the exchange rate produces a relative or comparative price levels for each branch and for the sector as a whole. Using Singapore as the base country, a comparative price level that is greater (lower) than 100 indicates that prices in that particular branch or sector in Hong Kong are higher (lower) than their counterparts in Singapore.

In 2004, the comparative price levels for air transport and telecommunications were higher in Singapore than in Hong Kong. The lower price level of air transport in Hong Kong is due to the lower cost reflected by the reduced amount of labour duplication, as explained in the next section. In telecommunications, fixed-line subscriptions and mobile phone subscriptions' prices were lower in Hong Kong due to its larger number of fixed-telecommunication network services (FTNS) and mobile phone service providers relative to Singapore. In 2004, Singapore had only two FTNS (Singtel and StarHub) and three mobile phone service providers – Singtel, StarHub and M1 compared with Hong Kong which had ten and six providers in each category, respectively[7]. This clearly demonstrates

[7] While 2004 figure was not available, in 2005, there were 10 wireline-based FTNS operators in Hong Kong.

more competition in fixed-line telecommunications and mobile phone subscriptions in Hong Kong which help lower the price level.

In terms of internet subscriptions, a study by the International Telecommunication Union (ITU) 2003, ranked Hong Kong as number one in the world in terms of affordability of internet access. This affordability is demonstrated by the fact that relative to Singapore, Hong Kong has a lower price level in internet subscriptions. As economic theory suggests, the number of Internet Service Providers (ISPs) in Hong Kong, 186 in 2004 against only 3 ISPs in Singapore in 2004, created greater competition and lower prices. The greater level of competition in Hong Kong's telecommunications is also probably due to the rate of change in competition after liberalisation. Singapore's telecommunications sector was fully liberalised in 2000 while for Hong Kong, this occurred in 2003. Both countries had similar strategies towards developing their telecommunications systems and sectors into premier international telecommunications hubs. Prior to 2000, initiatives such as IT2000, I-Hub and Singapore One were implemented to develop Singapore's IT and internet services[8]. The latest initiative, the Infocomm 21 strategy, was launched by Singapore's Infocomm Development Authority (IDA) and aimed at harnessing the infocomm technologies to improve Singapore's national competitiveness and to provide reliable, efficient and cost-effective connectivity to the rest of the world[9]. Similarly, Hong Kong's Telecommunications Authority introduced the Digital 21 IT Strategy in 1998. This was later reviewed in 2001 and updated in 2004 with the aim of continuous encouragement in harnessing the benefits of IT and a strengthening of Hong Kong's position as a leading international telecommunications hub and digital city. While both countries' strategies are rather similar, it appears that Hong Kong's liberalised telecommunications management was more effective in facilitating ease of entry and the creation of a more competitive market.

In 2004, the relative price of land transport in Singapore was half of that in Hong Kong[10]. Higher prices in Hong Kong are also shown in a study by UBS (2003), whereby the average rate of taxi charges was US$4.78 and bus/train services was US$1.26 while in Singapore, these were US$3.14 and US$0.83, respectively. Hong Kong's higher relative prices are also due to its additional surcharges for taxi services. This does not exist in Singapore. For example, surcharges are added for each additional passenger's luggage. On the other hand, lower prices in public transport in Singapore are also largely due to the lower cost of production. As noted by Lam and Toan (2006), capital investment in infrastructure, rolling stock and equipment is the responsibility of the government. Tan and Phang (2005) noted that Singapore's MRT was completely subsidised by the government. In contrast, Hong Kong's MTR (Mass Transit Railway) was only partially privatised in 2000 with the Hong Kong SAR government then owning 76 per cent of the MTR. Despite its majority ownership by the Government, the Hong Kong MTR is independently managed on commercial principles, is financially independent and does not rely on any subsidy from the Government. The argument here thus infers that Singapore's MRT production cost is relatively lower than Hong Kong's MTR which illustrates the significant relative price difference in land transport with the relatively higher price of Hong Kong's land transport.

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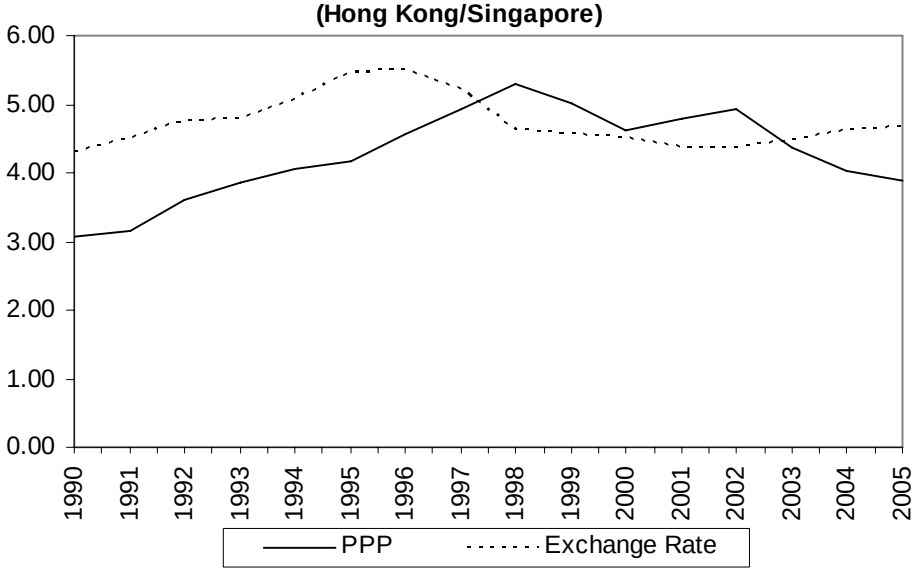
[8] For more details on such initiatives, see Chia, Lee and Yeo (1998).

[9] The IDA was formed from the merger of the Telecommunication Authority of Singapore (TAS) and National Computer Board (NCB) in December 1999.

[10] It is important to note here that as land transport here only covers taxi services and train passenger services. There was no data available for land freight transport in Singapore as thus this portion of the land transport industry was excluded in the derivation of PPPs and comparative price levels. In addition, private car ownership is not included in the study as this activity is not part of the transport industry as defined by each country's respective SIC codes.

Trends in PPPs, exchange rates and comparative price levels for Hong Kong and Singapore provide an interesting perspective on the transport and communications structure and price levels in both countries over time. These are shown in Figures 1 and 2.

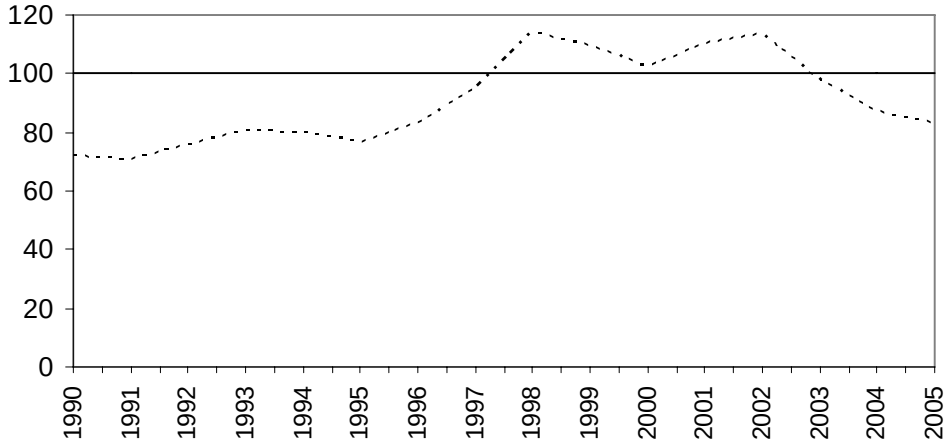
Figure 1
PPP vs Exchange Rate, 1990-2005
(Hong Kong/Singapore)



Source: For Hong Kong: National Income Section, Census and Statistics Department via http://www.censtatd.gov.hk/ (accessed on 5 October 2006).
Census and Statistics Department, *2005 Gross Domestic Product*.
For Singapore: Singapore Department of Statistics, *Yearbook of Statistics Singapore* (various issues). Singapore Department of Statistics, *Statistical Highlights 2006.* Singapore Department of Statistics, *Economic Survey of Singapore 2003*.
Exchange rates are in period averages and drawn from various issues of IMF, *International Financial Statistics Yearbook*.

Figure 1 shows that the overall transport and communications sector PPP was below the exchange rate from 1990 to 1997. From 1998 to 2002, the exchange rate fell below the overall PPP levels reflecting the onset of the Asian financial crisis. In terms of US currency, the Hong Kong dollar was stable over this period, given its peg to the US dollar. This has been the case since 1983, ensuring that the Hong Kong dollar was not affected by the financial crisis. The Singapore dollar on the other hand was significantly affected as its exchange rate had been based on a managed floating regime since the early 1970s. While both economies did not escape the effects of the financial crisis, Hong Kong was more adversely affected than Singapore as a result of changes in domestic prices. Lu and Yu (1999) pointed out that Hong Kong's currency regime meant that it could not manage the exchange rate to stabilise its domestic prices. This resulted in high domestic inflation occurring together with continuous appreciation of the Hong Kong dollar, which in turn made it vulnerable to currency attacks. In contrast, Singapore's managed floating exchange rate regime allowed its currency to adjust in an effective manner over the turbulent period. The outcomes are shown in Figure 1 and Figure 2 whereby the exchange rate shows the Hong Kong dollar appreciating against the Singapore dollar, but its higher domestic inflation is indicated by the falling PPP against the Singapore dollar. In PPP terms, from 1997 to 1998, the Hong Kong dollar fell from HK$ 4.93 to HK$ 5.28 per Singapore dollar, a 7 percent decrease in its purchasing power.

Figure 2
Comparative Price Level (Singapore=100), 1990-2005



Note: Comparative Price Level derived by dividing PPP by the exchange rate.
Time series PPPs derived by first calculating the ratio of Hong Kong transport and communications GDP deflator by the Singapore transport and communications GDP deflator. Note that the deflators are derived by taking the ratio of current over constant (at 2004 prices) transport and communications GDP. Finally these values are multiplied to the 2004 geometric average PPP from Table 4.
Exchange rates are in period averages.

Source: For Hong Kong: National Income Section, Census and Statistics Department via http://www.censtatd.gov.hk/ (accessed on 5 October 2006).
Census and Statistics Department, *2005 Gross Domestic Product.*
For Singapore: Singapore Department of Statistics, *Yearbook of Statistics Singapore* (various issues). Singapore Department of Statistics, *Statistical Highlights 2006.*
Singapore Department of Statistics, *Economic Survey of Singapore 2003.*
PPP from Table 4. Exchange rates are drawn from various issues of IMF, *International Financial Statistics Yearbook (various issues)*.

Figure 2 shows the relative price levels of Hong Kong against Singapore from 1990 to 2005. Prior to 1998, the general price level of transport and communications was relatively lower in Hong Kong, but the crisis appreciated the Hong Kong dollar accompanied by inflation in Hong Kong, ensuring a decline in Singapore's comparative price level from 1998 to 2000. From 2000 to 2002, Singapore's recovery from the Asian crisis was hampered by the slowdown in its economy due to the global downturn, thus lowering its comparative price level against Hong Kong. From 2003 onwards, Singapore's recovery had begun and by 2003 it had surpassed the price level of Hong Kong.

3.3 Output and Labour Productivity for the Benchmark Year, 2004

Table 5 shows the value added figures at branch level for both Hong Kong and Singapore for 2004. The Hong Kong figures in this table are converted into 2004 Singapore dollars. Examination of the value added shares of each branch shows that Hong Kong's air transport contributes the largest proportion while for Singapore; this is sea transport and port container throughput. These outcomes stem from the importance of air services in Hong Kong, both in terms of airport and airline services, as witnessed by the development of the country's new airport's continuous expansion and innovation. These are evident from the accolades it has received from various international surveys.

Singapore's sea transport and port container throughput contributed the largest share of value added, thus illustrating Singapore's aim of becoming a premier logistics hub with provision of excellent port facilities.

In 2004, labour productivity in Hong Kong's transport and communications sector, based on national accounts, was 89 percent of that in Singapore, thus indicating that Hong Kong's productivity level was approximately 11 percent below Singapore's level. Labour productivity in the transport industry was 74.9 percent of Singapore's level while for communications this was 126.6 per cent. The higher labour productivity in Hong Kong's telecommunications industry is consistent with the earlier analysis of a lower comparative price level for the telecommunications industry in Hong Kong. Subsequently, Singapore's stronger labour productivity in land transport and sea transport relative to Hong Kong is reflected in a lower comparative price level in these industries in Singapore. At branch level labour productivity, Hong Kong was above Singapore's level in only three out of seven branches; in air transport (142.6%), services allied to transport (117.3%), and telecommunications (158.1%).

The relatively higher labour productivity in Hong Kong's air transport services has much to do with their relative amount of inputs used. A comparison of arrival and departure fixed inputs helps explain how labour is allocated. In 2004, Singapore's two passenger terminals, with a total floor area of 634,100 m^2, had 16 baggage reclaim units (or number of arrival belts) and 310 check-in desks. In contrast, Hong Kong's single passenger terminal was 570,000 m^2, and had 12 baggage reclaim units and 288 check-in desks. Hong Kong International Airport (HKIA) thus has slightly less infrastructure but is able to handle more passengers (see Table 1). This infers that a large terminal like HKIA is cutting costs by reducing the amount of labour duplication. In terms of airfreight terminals, there are nine airfreight terminals operated by three ground handling agents in Changi Airfreight Centre while there are only two airfreight terminals operated by two ground handling agents in HKIA. Since both airfreight terminals are designed to handle approximately 3 million tonnes of cargo, this also infers that more capital and thus more labour is being employed in the Changi Airfreight terminal[11]. With HKIA thus handling more freight and passengers, it implies that HKIA uses less labour to work with capital in one passenger terminal and two airfreight terminals. On the other hand, Singapore's Changi Airport uses more labour as it has to handle two passenger terminals and nine airfreight terminals. This analysis helps explain the lower estimated labour productivity in Singapore. A more accurate productivity analysis would be achieved if a multi-factor productivity approach was adopted. This is however not possible due to lack of reliable capital stock figures and an appropriate capital stock PPP.

Sea transport and port container throughput play a major role in both countries as they are closely linked with entrepot trade. Value added and labour productivity in Hong Kong relative to Singapore was 63.5 and 39.2 percent, respectively, in 2004. Caution should be exercised in interpretation of these results as the industry PPPs within this branch vary significantly (see Appendix Table A1.1). Considering the port container throughput alone, Hong Kong's output and productivity is 70 and 73 percent of Singapore's level, respectively. When sea transport in terms of passenger and freight is taken into account, Hong Kong's relative output fell by 10 percent to 63.5 percent. Relative productivity fared worse as it is reduced to 39.2 percent of Singapore's level. Close examination shows Hong Kong's labour input in ocean, coastal and inland water transport to be 18,543 persons, whereas for Singapore this is 4,649 persons. This represents 25 percent of Hong Kong's labour input while in terms of the number of establishments, those in Singapore were half of those in Hong Kong (491 to 980). Based

[11] The handling capacity is obtained from each country's airport website.

on the amount of cargo throughput, port container throughput and passengers in Hong Kong in 2004 relative to Singapore, Hong Kong's capital stock may be substantially less than that of Singapore. This probability seems to hold true as the approximate number of berths for 2006 in Hong Kong is 42, with frontage length totalling around 15,000m and covering nearly 5 km^2. In contrast, Singapore's figures are 109 berths, 19,299m and 9.54 km^2, respectively. Hence, if capital stock was considered in productivity measurement, these considerations should raise Hong Kong's productivity level relative to Singapore's.

Table 5
Real Output and Labour productivity in Transport and Communications, Singapore and Hong Kong, 2004 (at S$)

	Gross Value Added (million S$)		Hong Kong/ Singapore	Value Added per person		Hong Kong/ Singapore
	Hong Kong	Singapore	(%)	Hong Kong	Singapore	(%)
Transport	22,779 a	16,508	138.0	71,187	95,007	74.9
Land	3,153	1,935	162.9	15,447	18,922	81.6
Sea and PCT	4,971	7,831	63.5	144,986	369,791	39.2
Air	9,268	4,811	192.6	316,440	221,879	142.6
Services allied to transport	4,138 b	1,931	214.3	79,105 b	67,428	117.3
Communications	7,403 a	4,066	182.1	241,080	190,458	126.6
Telecommunications	6,709	3,574	187.7	375,060	237,234	158.1
Postal services	405	491	82.5	31,614	78,232	40.4
Transport & Comms.						
Current Table (c)	30,003	20,573	145.8	85,550	105,451	81.1
National Accounts (d)	31,557	21,489	146.9	89,982	101,124	89.0

Notes: PCT - Port Container throughput.
(a) Sum of disaggregated figures do not tally with Tables' aggregated figure due to the use of PPPs.
(b) Value added converted into Singaore dollars using Transport PPP.
(c) Value added based on transport and Communcations PPP thus differs to the sum of value added of transport and value added of communications. Value added per person engaged derived using Tables 2 and 3 value added (converted into Singapore 2004 dollars) and number of persons engaged.
(d) Value added per person engaged derived using national accounts' value added and ILO's employment figures.

Source: Tables 2 and 3. PPPs from Table 4.

In communications, output and productivity levels in Hong Kong were above Singapore's levels, largely because of the performance of its telecommunications sub-sector. Table 5 shows value added for Hong Kong and Singapore to be $6,709 million and $3,574 million, respectively. Labour productivity shows Hong Kong to be 158.1 percent of Singapore's level in 2004 which demonstrates its higher productivity relative to Singapore. This finding is supported by the International Telecommunication Union (ITU) *Internet for a Mobile Generation 2002* report. Hong Kong was ranked number one in Mobile/Internet index ranking, which measures how an economy is performing in terms of information and communication technologies[12]. As described earlier, the complete liberalisation of Singapore's telecommunications created competition and promoted innovative services, lowered prices and produced more service providers. As a result, Singapore was reported in the World Economic Forum 2003 as the third most IT-savvy country in the world, behind Finland and the United States[13]. However this does not seem to have translated into better productivity relative to Hong Kong over the last two years of the study's review period. Hong Kong's liberalisation of its telecommunications sector in 2003 introduced innovative and strategic plans as part of its commitment to becoming a leading

[12] Although the report focused on 2002, the current study reaffirms the results showing Hong Kong's better performance in mobile communications and internet over Singapore.
[13] The report entitled "The Global Information Technology Report 2002-2003: Readiness for the Networked World" was released in March 2003.

international telecommunications hub and digital city. As argued above, easier access to Hong Kong's market is being reflected in more competitive provision of fixed line, mobile subscriptions and internet services in Hong Kong, relative to Singapore.

In postal services, Singapore and Hong Kong have similar levels of reliability and have been awarded the gold level certificate for their speed post courier service, in recent years, by the Universal Postal Union. Their level of efficiency in terms of mail delivery standards is very similar. In Singapore, 99.9 percent of mail is delivered by the next working day. For Hong Kong, this is 99.7 percent[14]. However, in terms of output and productivity levels, the Hong Kong postal service is 82.5 percent and 40.4 percent of Singapore's level, respectively. The fall in performance is attributed to the number of persons engaged in Hong Kong's postal service, which is twice Singapore's level. A comparison of postal service infrastructure shows Hong Kong to have more post offices and post boxes than Singapore. Hong Kong Post has 133 post offices and nearly 1,000 post boxes[15]. In contrast, SingPost (name given to Singapore post) has approximately 60 post offices, about 80 authorised postal agencies, and over 800 post boxes. The fact that there are more post offices in Hong Kong and fewer post boxes than in Singapore suggests that Hong Kong post uses more labour to staff their offices. In addition, the lower labour productivity of Hong Kong's postal service relative to Singapore's is compounded by un-staffed services such as the Self-service Automated Machines (SAMs) provided by SingPost. These types of postal services do not exist in Hong Kong. SingPost has around 200 SAMs which is a 24-hour automated post office that allows individuals to weigh packages, buy stamps and even pay bills or fines. This added service reduces the need for labour and improves productivity. For Hong Kong post, these services are still performed at post offices thus making Hong Kong post more labour intensive.

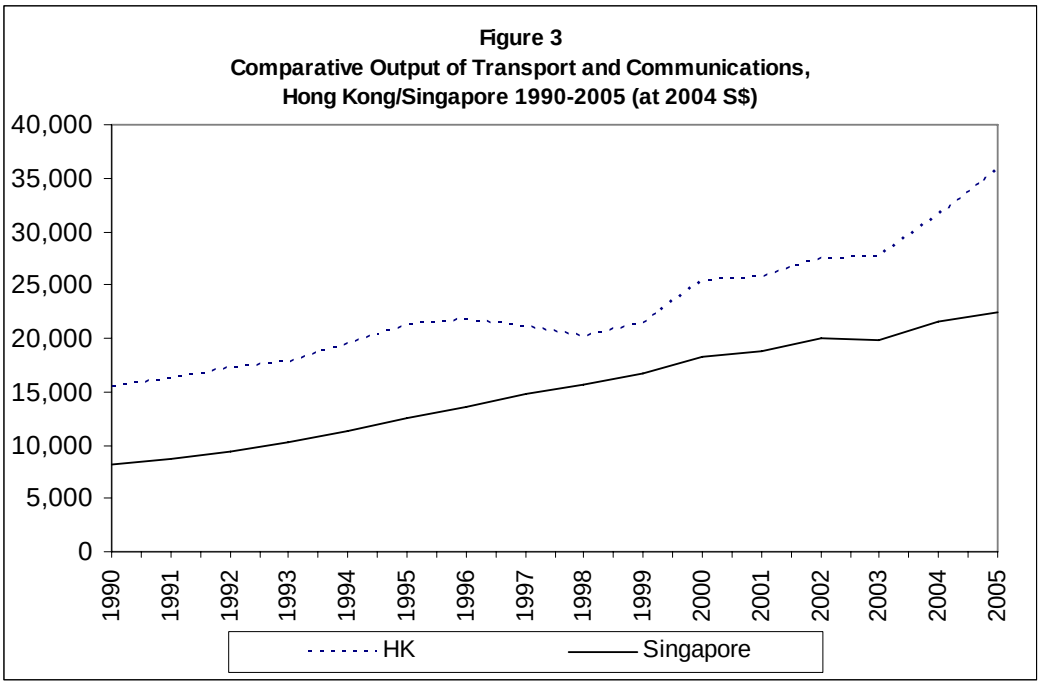
3.4 Trends in Real Output and Labour Productivity, 1990-2005

Figure 3 shows the comparative output of transport and communications of Hong Kong and Singapore from 1990 to 2005. From 1990 to 1998, there was some catch-up in Singapore's transport and communications output relative to Hong Kong. Even with the onset of the Asian financial crisis, with Singapore's economy contracting by 1.4 percent and services contracting by 2.0 percent, its transport and communications sector experienced a positive growth rate of around 6 percent in 1998. However from 1999 onwards, the gap between Hong Kong's and Singapore's output had widened. In 2001, Singapore fell into recession because of a global economic downturn but its transport and communications sector maintained growth of around 3 percent. This outcome is ascertained by IDA (2002, p. 6) which states "the infocomm industry in Singapore was affected by the global recession in 2001, but there is evidence that the industry remains resilient". In 2003, Singapore's services relating to tourism were badly hit by the outbreak of Severe Acute Respiratory Syndrome (SARS), especially in transport and communications, which fell by 0.7 percent. In contrast, Hong Kong experienced a 0.7 percent growth in this sector largely because of strong performance in communications even allowing for a slow-down in its transport and storage sector growth.

[14] Information drawn from each country's postal annual reports.

[15] Note that mobile post offices are excluded from the number of post offices as their hours of operation do not exceed 80 mins per day and do not open every work day. Figures are drawn from Hong Kong Post Annual Report 2004/05.

Figure 3
Comparative Output of Transport and Communications, Hong Kong/Singapore 1990-2005 (at 2004 S$)



Source: GDP of transport & communications for Hong Kong from National Income Section, Census and Statistics Department via http://www.censtatd.gov.hk/ (accessed on 5 October 2006).
Census and Statistics Department, *2005 Gross Domestic Product.*
GDP of transport & communications for Singapore from Singapore Department of Statistics, *Yearbook of Statistics Singapore* (various issues). Singapore Department of Statistics, *Statistical Highlights 2006*. Singapore Department of Statistics, *Economic Survey of Singapore 2003*.

Table 6, Figure 4 and Figure 5 show trends in labour productivity in transport and communications from 1990 to 2005, derived by applying indices of real value added and employment in each country to the benchmark productivity comparison of Table 5. A comparison of labour productivity in terms of employment and average annual hours worked shows the latter with a slightly better outcome for Hong Kong. In terms of labour productivity per person engaged, from 1990 to 1991, Hong Kong was above Singapore's level. However, the period 1990 to 1998 shows a general downward trend in Hong Kong's labour productivity relative to Singapore's. From 2000 onward, Hong Kong's productivity relative to Singapore's began to improve and by 2005 had overtaken Singapore, thus indicating some form of catch-up in labour productivity. From 1990 to 1998, labour productivity fell from 104.5 to 77.4 percent of Singapore's level in terms of employment and in terms of hours worked for the same period, declined from 108.4 to 80.5. From 1998 to 2000, labour productivity in Hong Kong hovered around 78.2 percent of Singapore's level in terms of employment and 79.8 percent in terms of hours worked.

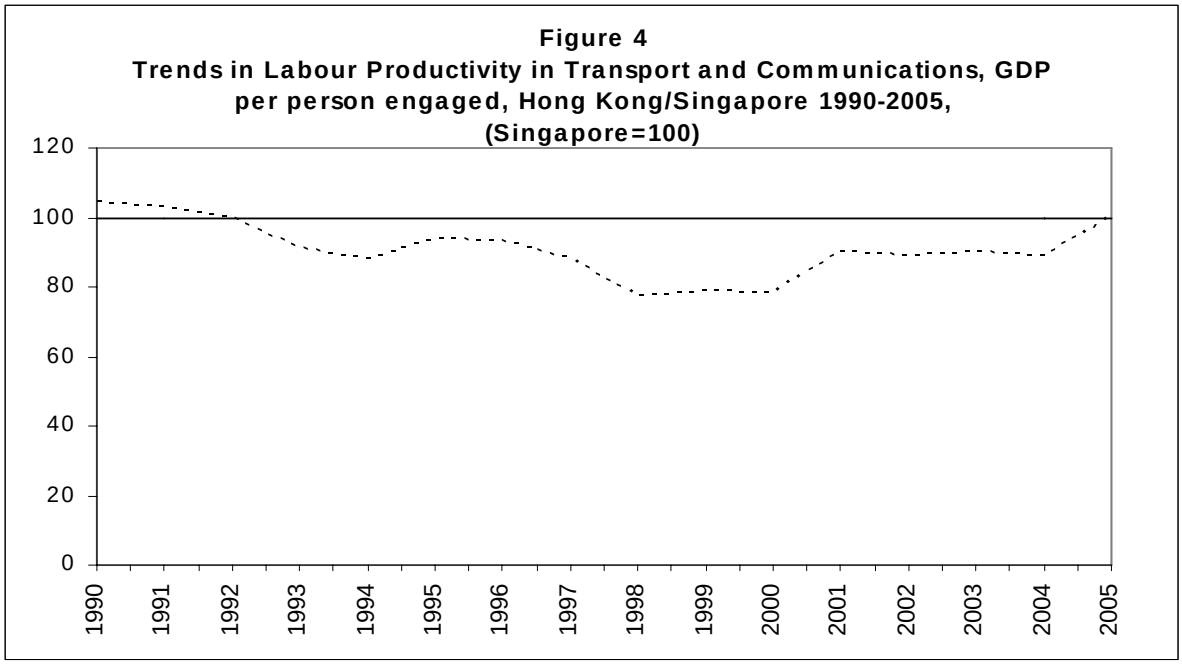
Table 6
Trends in Labour Productivity (GDP per person engaged and per hour worked) in Transport and Communications, 1990-2005 (at 2004 S$)

	Value Added per person		Hong Kong/ Singapore (%)	Value Added per hour		Hong Kong/ Singapore (%)
	Hong Kong	Singapore		Hong Kong	Singapore	
1990	57,966	55,464	104.5	27.5	25.4	108.4
1991	58,980	57,252	103.0	27.8	26.1	106.2
1992	58,717	58,749	99.9	28.6	27.3	104.6
1993	56,363	61,715	91.3	26.9	28.7	93.8
1994	57,187	64,961	88.0	27.3	30.2	90.2
1995	64,544	68,674	94.0	31.4	31.6	99.4
1996	64,569	69,353	93.1	30.7	31.9	96.2
1997	61,592	70,045	87.9	29.8	32.5	91.8
1998	58,363	75,422	77.4	28.4	35.3	80.5
1999	64,517	81,779	78.9	30.9	38.5	80.3
2000	72,570	92,626	78.3	34.2	43.6	78.6
2001	74,219	82,210	90.3	35.2	38.9	90.3
2002	81,223	91,129	89.1	38.0	43.4	87.5
2003	82,701	91,707	90.2	39.0	43.9	88.9
2004	89,982	101,124	89.0	41.7	48.5	85.8
2005	100,621	100,341	100.3	47.0	47.9	98.0

Note:
Hong Kong and Singapore annual hrs worked based on average weekly hrs worked multiplied by number of working weeks which is 45 and 46, respectively.

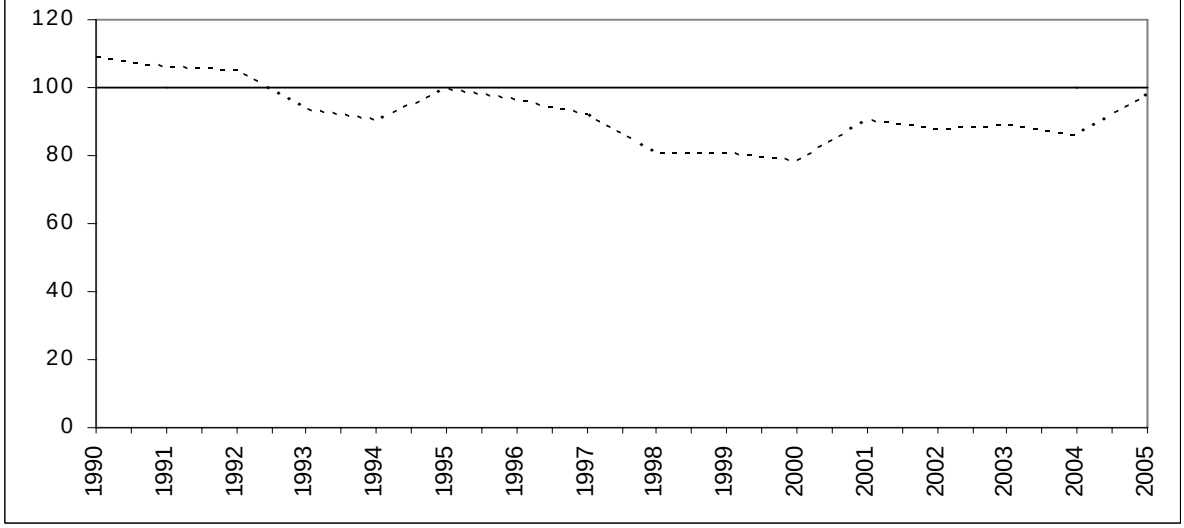
Source: GDP of transport & communications for Hong Kong from National Income Section, Census and Statistics Department via http://www.censtatd.gov.hk/ (accessed on 5 October 2006).
Census and Statistics Department, *2005 Gross Domestic Product.*
Number of persons engaged drawn from Census and Statistics Department, *Hong Kong Monthly Digest of Statistics June 2006*. From 1990 to 1995, data drawn from ILO website (www.ilo.org) accessed on 11 October 2006.
GDP of transport & communications for Singapore from Singapore Department of Statistics, *Yearbook of Statistics Singapore* (various issues). Singapore Department of Statistics, *Statistical Highlights 2006*. Singapore Department of Statistics, *Economic Survey of Singapore 2003.*
Number of persons engaged drawn from Singapore Department of Statistics, *Yearbook of Statistics Singapore* (various issues). 2005 figures based on growth rate drawn from Manpower Research and Statistics Department, *Labour Market 2005*.
ILO, *Yearbook of Labour Statistics 2000 and 2005*. Geneva and via ILO website.

Figure 4
Trends in Labour Productivity in Transport and Communications, GDP per person engaged, Hong Kong/Singapore 1990-2005, (Singapore=100)



Source: Table 6.

Figure 5
Trends in Labour Productivity in Transport and Communications, GDP per hour worked, Hong Kong/Singapore 1990-2005, (Singapore=100)



Source: Table 6.

4. Conclusion

This paper draws on the ICOP industry-of-origin approach to international comparison to provide the first in a series of papers focused on output and productivity comparisons in the service sectors in Hong Kong and Singapore. This study provides a comparative estimate of real output and labour productivity in the transport and communications sector in Hong Kong and Singapore. For the benchmark year 2004, value added in Hong Kong's transport and communications sector was approximately 146.9% and labour productivity 89 percent of Singapore's levels. Over the period 1990 to 2005, Hong Kong's transport and communications sector productivity operated, on average, at approximately 91 percent of Singapore's level. The lowest levels were during the Asian financial crisis, which suggests greater impact of the crisis in Hong Kong relative to

Singapore. The onset of the global economic downturn in 2001 and the SARs outbreak adversely affected both countries, ensuring that the period from 2002 to 2004 showed no signs of improvement in real output and labour productivity in the transport and communications sector in both countries.

Although the study may have focused on a partial-productivity analysis, the results are quite informative in that better productivity had much to do with greater competition as identified in the telecommunications industry. Government subsidies also do play a huge role in enhancing productivity performance. Overall, while Singapore may have been shown to be the outstanding performer in labour productivity, the authors feel that a total-factor productivity analysis would provide robust results since both Hong Kong and Singapore recognise the importance in capital utilisation in conjunction with labour for both countries faced with scarce natural resources.

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Appendix

Table A1.1 - Matching of Product Items, Hong Kong-Singapore, Transport and Communications, 2004

HSIC Code	Hong Kong Product Item	Unit	Hong Kong Quantity ('000)	Hong Kong Gross Value (mill. HK$)	Hong Kong Dollar Unit Value	Hong Kong Quantity valued at Singapore unit value (mill. S$)	Unit Value Ratio HK$/S$ Hong Kong Quantity Weights (Paasche)
	LAND TRANSPORT						
711	Passenger traffic	passengers	3,981,201	25,042	6.29	2,661.7	9.41
	TOTAL MATCHED			25,042		2,661.7	
	SEA/COASTAL TRANSPORT AND PORT CONTAINER THROUGHPUT						
715	Passenger traffic	passengers	21,407	2,323	108.51	227.5	10.21
714	Freight traffic	tonnes	220,879	52,050	235.65	7,325.9	7.10
716	Port Container throughput	tonnes	21,984	13,709	623.61	7,542.7	1.82
	TOTAL MATCHED			68,083		15,096	4.51
	AIR TRANSPORT						
717	Passenger traffic	passengers	36,287	31,813	876.70	10,311.0	3.09
718	Freight traffic	tonnes	3,090	17,795	5,758.86	6,006.5	2.96
	TOTAL MATCHED			49,607		16,317	3.04
	COMMUNICATIONS						
7321	Telephone Subscription	number	3,780	19,979	5,285.34	7,321.5	2.73
732901	Mobilephone subscription	number	8,214	11,970	1,457.24	4,477.4	2.67
732902	Internet subscription (Broadband and dial-up)	number	2,488	2,842	1,142.36	1,609.3	1.77
	Telecommunications			34,791		13,408	2.59
	Mail handled	'000 number	1,273,000	3,567	2.80	450.6	7.92
	TOTAL COMMUNICATIONS			38,357		13,859	2.77

na: not available.

Source: Table 1.

SSIC 2005 Code	Singapore Product Item	Unit	Singapore Quantity ('000)	Singapore Gross Value (mill. S$)	Singapore Dollar Unit Value	Singapore Quantity valued at HK unit Value (mill. HK$)	Unit Value Ratio HK$/S$ Singapore Quantity Weights (Laspeyres)
	LAND TRANSPORT						
5221	Passenger traffic	passengers	1,828,902	1,223	0.7	11,504	9.41
	TOTAL			1,223		11,504	
	SEA/COASTAL TRANSPORT AND PORT CONTAINER THROUGHPUT						
53103+53202 +53209	Passenger traffic	passengers	7,482	80	10.6	812	10.21
5310 (excl. 53103)	Freight traffic	tonnes	393,418	13,049	33.2	92,709	7.10
5539	Port Container throughput	tonnes	21,329	7,318	343.1	13,301	1.82
	TOTAL			20,446		106,822	5.22
	AIR TRANSPORT						
54002	Passenger traffic	passengers	28,606	8,129	284.2	25,079	3.09
54003	Freight traffic	tonnes	1,775	3,450	1,943.8	10,222	2.96
	TOTAL			11,579		35,301	3.05
	COMMUNICATIONS						
62011	Telephone Subscription	number	1,864	3,610	1,936.9	9,852	2.73
62012	Mobilephone subscription	number	3,861	2,105	545.1	5,626	2.67
62021	Internet subscription (Broadband and dial-up)	number	2,226	1,440	646.8	2,543	1.77
	Telecommunications			7,155		18,021	2.52
5601	Mail handled	'000 number	834,402	295	0.35	2,338	7.92
	TOTAL COMMUNICATIONS			7,450		20,359	2.73